May 24, 1949. C. W. SAVIDGE 2,470,956

REFRIGERATOR UNIT

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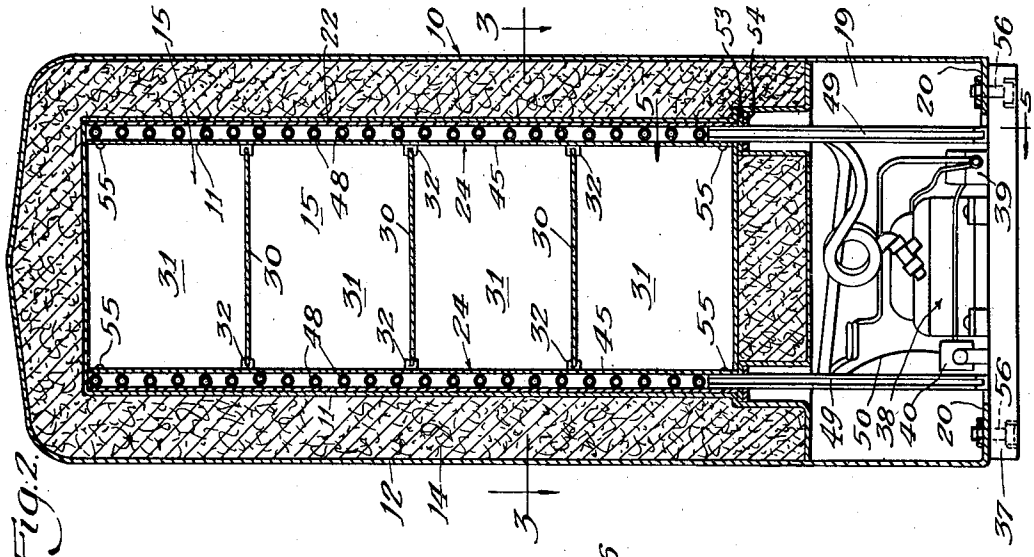

Fig. 2.

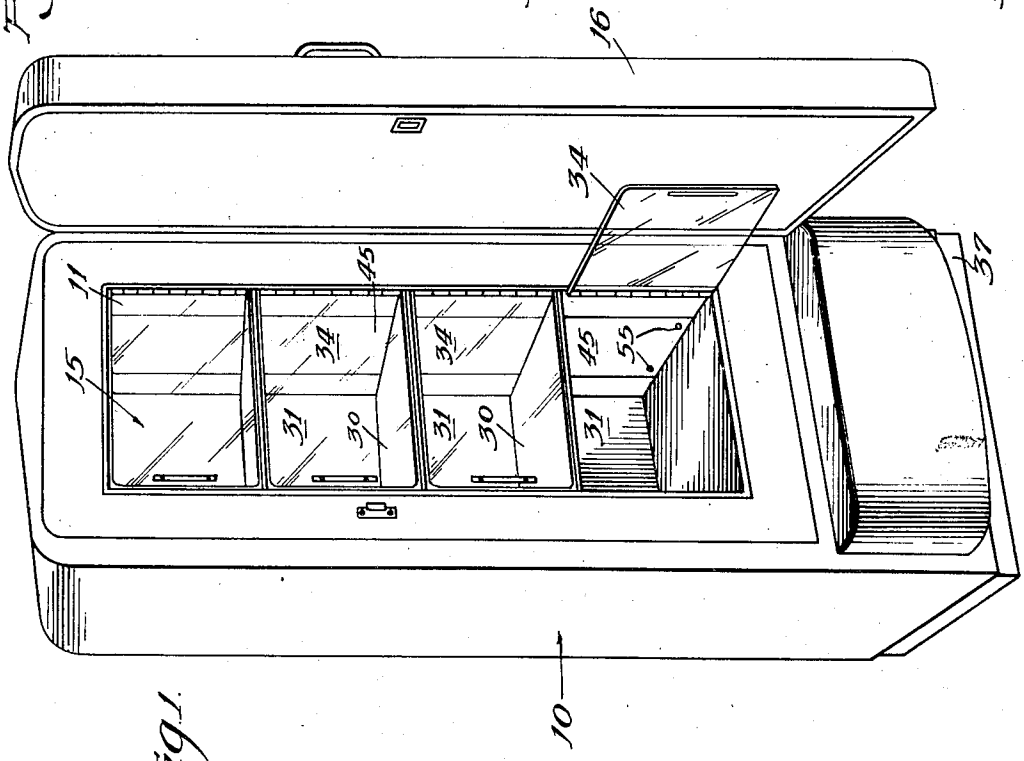

Fig. 1.

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Fig. 3.

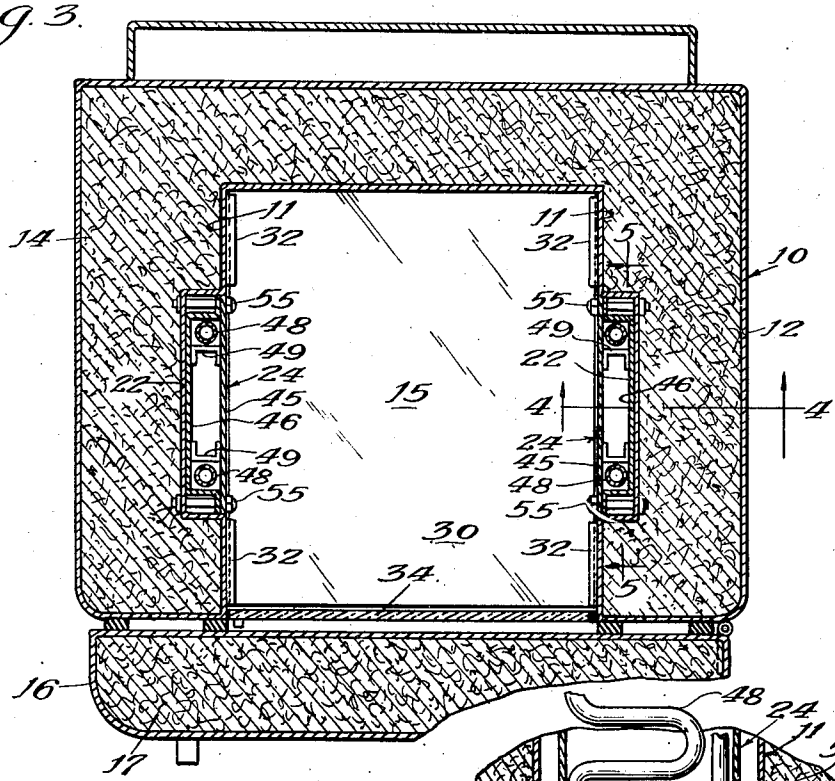


Fig. 4.

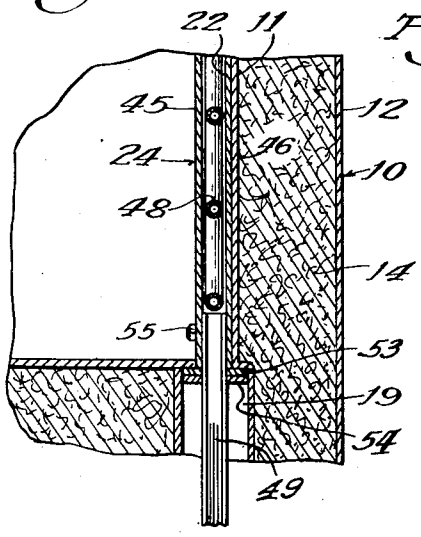
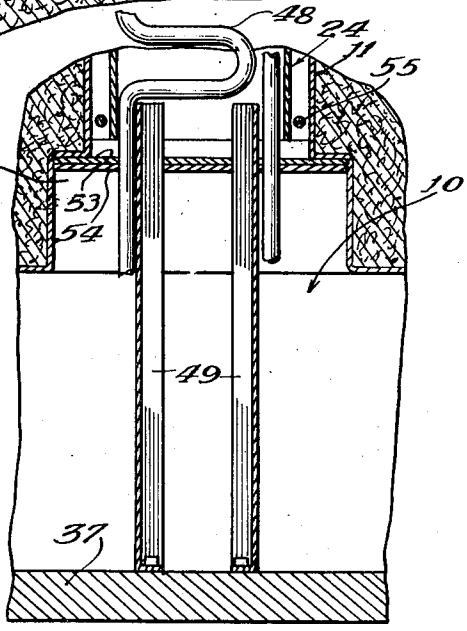


Fig. 5.



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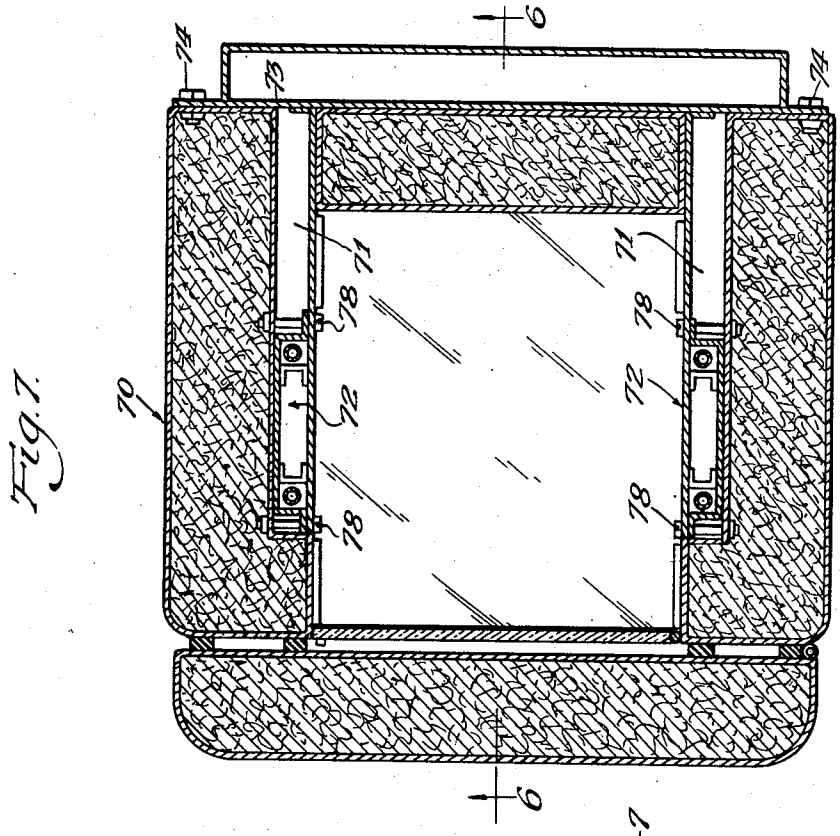

Fig. 7.

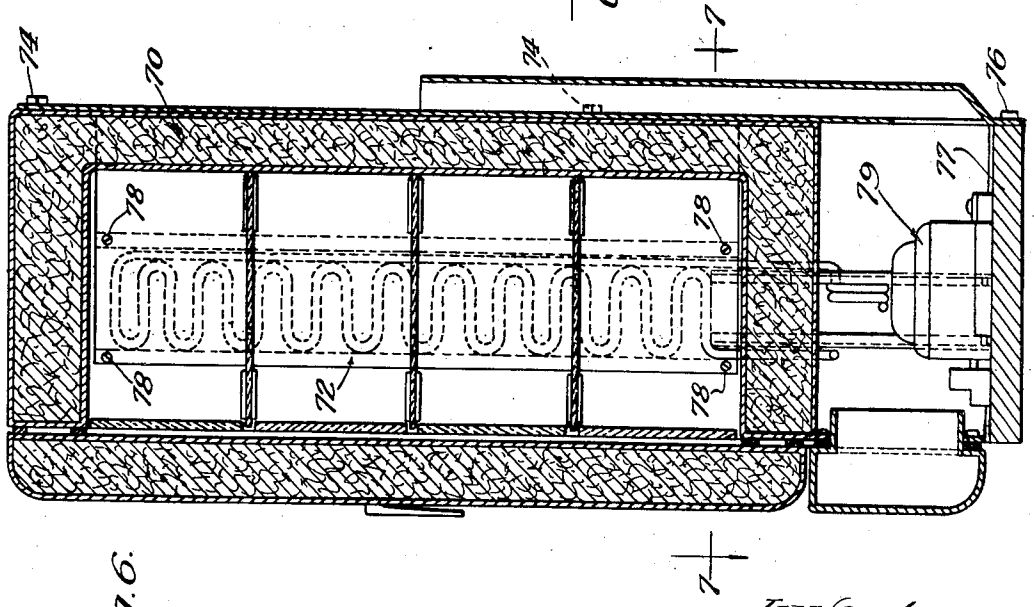

Fig. 6.

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UNITED STATES PATENT OFFICE

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REFRIGERATOR UNIT

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Application August 1, 1945, Serial No. 608,216

7 Claims. (Cl. 62—116)

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My present invention relates to mechanical refrigerators, and more particularly to refrigerators of the type adapted for household use. The present invention is adapted for embodiment in both conventional types of domestic refrigerators as well as so-called "deep-freeze" or "storage locker" types of refrigerators, as will be apparent from the following description.

In connection with both conventional refrigerators as well as "deep freeze" types of refrigerators for use in the home, the matter of field maintenance and service has long been a major problem and has been of great concern to refrigerator manufacturers because of the necessity of maintaining relatively large corps of skilled artisans. To correct certain defects or faulty conditions of operation of refrigerators frequently necessitates a substantial consumption of time, requiring under certain conditions, the disconnection and reconnection of certain of the refrigerant carrying conduits and mechanisms. By reason of the necessity of having skilled artisans service such refrigerators in the field it necessarily follows that rendering such service is often relatively expensive.

One of the objects of this invention is to provide a novel and improved mechanical refrigerator wherein the entire refrigerating mechanism, including the evaporator unit or units, is constructed as a unitary, self contained instrumentality which may be quickly and easily assembled in and disassembled from operative relation to a heat insulated storage cabinet.

Another object is to provide a novel and improved mechanical refrigerator wherein the entire refrigerating mechanism is constructed as a self contained unit, adapted to be operably associated with a heat insulated cabinet in a manner so as to permit quick and easy replacement of the entire unit by unskilled persons.

A further object is to provide an improved mechanical refrigerator wherein the entire refrigerating mechanism is constructed as a self-contained, unitary assembly, including an evaporator unit, and wherein the evaporator unit and refrigerator cabinet are so constructed and arranged as to permit disposition of the evaporator unit in contiguous relation to the inner wall of the storage chamber of the refrigerator cabinet.

Still another object is to provide an improved refrigerator of the character indicated which is constructed and arranged so as to effect great economies in maintenance and service, and wherein the period of time required for restoring the

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refrigerator to efficient operating condition is reduced to a minimum.

A still further object is to provide an improved refrigerator of the character indicated, adapted to be constructed as a "deep freeze" storage unit, which occupies a relatively small amount of floor space so as to readily lend itself for use in kitchens, halls and other parts of homes or apartments where available floor space is extremely limited.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings, wherein:

Figure 1 is a perspective view of the refrigerator embodying the present invention showing the internal compartmental arrangement of the storage chamber.

Figure 2 is a vertical transverse section through the refrigerator.

Figure 3 is an enlarged, horizontal, transverse sectional view through the refrigerator, taken substantially as indicated at line 3—3 on Figure 2.

Figure 4 is a fragmentary sectional view through one of the vertical walls of the cabinet and through one of the evaporator units, taken substantially as indicated at line 4—4 on Figure 3.

Figure 5 is a fragmentary sectional view through the lower portion of one of the evaporator units and mounting therefor, and taken substantially as indicated at line 5—5 on Figure 3.

Figure 6 is a vertical section through a refrigerator embodying a modified form of the present invention, taken substantially as indicated at line 6—6 on Figure 7, and

Figure 7 is a horizontal sectional view through the lower portion of the refrigerator, taken substantially as indicated at line 7—7 on Figure 6.

The refrigerator embodying the present invention as described and as illustrated in the drawings may be understood to be of the "deep freeze" or "locker storage" type, and manifestly it may also be constructed so as to serve as a conventional refrigerator by merely readjusting the refrigerating mechanism accordingly. If desired, the proportions of the cabinet structure and arrangement of the interior of the storage chamber may be altered in form and dimensions to more suitably serve as a conventional refrigerator.

In the construction shown, the refrigerator comprises a cabinet 10, having inner and outer

walls 11 and 12 respectively, disposed in spaced apart relation to each other, with the space between the walls filled with a suitable heat insulating material, as indicated at 14. The inner walls of the cabinet define a food storage chamber 15, which is open at its forward side to afford access to the interior thereof. Associated with said opening is a hinged door as indicated at 16, which is also of double wall construction, filled with suitable heat insulated material, as indicated at 17. The bottom portion of the cabient is formed to provide a mechanism chamber as indicated at 19, disposed below the storage chamber 15. As may be seen in Figure 2 of the drawings, the outer walls of the cabinet terminate at their lower ends in an inwardly extending flange 20.

As may be seen in Figures 1 and 3 of the drawings, each of the two sides of the inner wall 11 is formed to provide an inwardly open, upright, elongated cavity 22, extending substantially the entire height of the storage chamber 15, and in open communication at their lower ends with the mechanism chamber 19, as may be seen in Figures 2, 4 and 5 of the drawings. These cavities are adapted to accommodate therein elongated evaporator units, designated generally at 24.

As shown in the drawings, the evaporator units are so constructed and dimensioned that when disposed in the cavities, the inner surfaces are substantially flush and continuous with the inner side walls of the storage compartment 15 of said cabinet. While the construction illustrated is preferred manifestly if desired, the inner side walls defining the storage chamber of the cabinet might be made flat and the evaporator elements may be directly connected to the outer surface of said inner walls. This latter construction, however, would desirably require the use of sheet metal to form suitable pockets or receptacles into which the evaporator units may be conveniently telescoped into or withdrawn from for purposes as will hereinafter be described.

The storage chamber 15 is provided with a plurality of vertically spaced apart, horizontally extending partitions 30, forming a tier of vertically arranged compartments 31. These partitions preferably are glass panels and are supported at their side edges in brackets 32, of U-shaped cross section, secured to the sides of the inner wall 11 of the cabinet. The front openings of the compartments 31 are provided with separate doors 34, hingedly connected to the forward edge of one of the sides of the inner wall 11 of the cabinet. The doors 34 are preferably of transparent material such as glass, so that the foodstuffs within the respective compartments may be readily observed without the necessity of opening the doors 34. By virtue of such a compartmental arrangement, it is possible to properly and efficiently segregate foodstuffs and also enable maintenance of order, and easy replacement in or withdrawal of foodstuffs from the respective compartments. This arrangement effects a substantial conservation of energy and consequent economies of operation as a result of only one compartment being exposed to atmosphere at a time when depositing in or withdrawing items from the respective compartments.

The entire refrigerating mechanism is constructed as a self-contained, unitary assembly adapted to be quickly and easily mounted in proper operative relation to the cabinet 10, or withdrawn therefrom, and a new or substitute unit quickly and easily inserted in its place. The unitary refrigerating mechanism assembly includes a mounting base 37 on which there is fixedly secured a unitary mechanism 38, comprising a motor, compressor, and condenser. Also mounted on the base 37 is a solenoid valve 39 and a temperature control switch 40.

Each of the evaporator units includes an upright elongated housing comprising a flat panel 45, and a spaced apart panel 46, having the marginal edges thereof bent and offset and attached to the marginal edges of the panel 45, as clearly seen in Figure 3 of the drawings. These housing members are rigidly connected together, as by welding, and each has rigidly mounted therein, as by welding or soldering, a flat, sinuous tubular coil 48, the opposite ends of which, as may be seen in Figure 5 of the drawings, project downwardly below the sheet metal housing, and are connected into the refrigerating fluid circulating system.

The evaporator units are mounted in upright, spaced apart relation on the base 37, by pairs of channel shaped bracket members 49. The upper ends of each pair of channels 49 are rigidly attached to a housing of one evaporator unit as by welding. Thus the evaporator units are fixedly supported in upright relation directly upon the mounting base 37. For simplicity in construction, the coils of the respective evaporator units may be connected in series relation.

The switch 40 is connected by a conductor wire 50 to a suitable temperature responsive device (not shown) mounted within one of the evaporator units, for controlling the operation of the solenoid valve 39, which controls the supply of fluid refrigerant to the coils of the evaporator units and regulates the temperature of the storage chamber 15, in a manner well understood in the art. Since the mechanism per se does not constitute a part of the present invention, it is believed unnecessary to describe its construction and operation in any further detail.

In order to obtain maximum efficiency of the evaporator units, the lower ends of the cavities 22 formed in the inner walls of the cabinet, and in which the evaporator units are mounted, are closed by sealing gaskets 53, supported on plates 54 which in turn are welded to the two sets of channel brackets 49, as clearly seen in Figures 4 and 5 of the drawings.

After the unitary refrigerating mechanism is mounted in the cabinet, the evaporator units are rigidly anchored at top and bottom in the cavities 22, formed in the two side walls of chamber 15 of the cabinet, by means of screws 55, connected to the recessed outer wall portion of the cavities as seen in Figures 2 and 3 of the drawings. The entire mechanism assembly is further fixedly connected with respect to the cabinet by a plurality of screws 56, extending upwardly through the bottom of the mounting base 37, and engaged in bosses provided on the marginal flange 20 of the outer walls of the cabinet, as seen in Figure 2.

In conventional types of refrigerating units, as well as present-day commercially available "deep freeze" refrigerator units, the problem of rendering service in the field is extremely costly and time consuming. When it is necessary to disconnect pipes of the evaporator coils in the field, there is presented dehydration and evacuation problems which are usually attended by the loss of refrigerant when making such disconnection and connections.

To disconnect the entire unitary assembly of the refrigerating mechanism from the cabinet merely necessitates the removal of the screws 55

holding the evaporator units in place, and the removal of the screws 56 connecting the mounting base to the bottom of the cabinet. The cabinet and the mechanism may then be readily separated one from another by lifting the cabinet upwardly off of the refrigerating mechanism. The cabinet can then be placed over a new or substitute mechanism, or, a substitute cabinet can be placed over the same mechanism and the two parts connected in place by the screws 55 and 56. Thus field maintenance and servicing of such refrigerators may be performed expeditiously and economically by unskilled individuals. The repair or servicing of the removed unitary refrigerating mechanisms may then be done at the factory, or suitably located service stations, by relatively few skilled artisans. In the making of such a substitution of the self-contained unitary refrigerating mechanism, it is unnecessary to make any connections or disconnections of the piping or individual mechanisms and thus permits making the change or substitution in a minimum period of time and thereby reducing to a minimum the period of time that the refrigerator is inoperative.

In the modified construction represented in Figures 6 and 7 of the drawings the basic concept disclosed is substantially the same as represented in Figures 1 to 5 of the drawings with the exception that the unitary self-contained refrigerating mechanism assembly is adapted to be inserted into the refrigerator cabinet 70, from the rear side wall thereof. In this construction the cabinet 70 is formed with upwardly extending cavities 71 in opposite side walls thereof, into which there is adapted to be projected evaporator units, indicated generally at 72. One of the panels of the housing of each of the evaporator units is of substantial width and has its rear edge thereof welded to a removable rear panel 73, which is adapted to be detachably connected to the outer rear wall of the cabinet 70 by means of screws 74. The evaporator units 72 are otherwise of the same general construction as heretofore described and are mounted in fixed relation on a mounting base 77 together with the other elements of the refrigerating apparatus, designated generally at 79, as described in connection with the construction illustrated in Figures 1 to 5 of the drawings. The rear panel 73, to which the evaporator units are rigidly connected, is also rigidly connected at its lower end by screws 76 to the mounting base 77. Each of the evaporator units 72 are secured in position in the cavities of the inner walls of the cabinet by screws 78. Thus to remove the complete, self-contained refrigerating mechanism, merely requires the removal of the screws 74 and 78 and the cabinet may then be withdrawn in a forwardly direction, and separated from the self-contained mechanism. A new unitary assembly or substitute one may be readily repositioned within the cabinet by telescoping it into the rear wall of said cabinet and then by means of the screws 74 and 78 rigidly anchoring the unit in fixed relation to the cabinet.

Various other arrangements may be provided for connecting the mounting base to the cabinet and if desired, an auxiliary base may be provided in the cabinet upon which the mounting base 77 may be slidably mounted into and out of operative relation to said cabinet.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope without sacrificing any of the advantages thereof.

I claim as my invention:

1. A refrigerator comprising a double walled, heat insulated cabinet formed to provide a food storage chamber and having a door affording access to the interior of said chamber, each of a pair of opposite vertical walls of the cabinet being formed with an upright, elongated cavity, contiguous to said chamber, for accommodating an evaporator unit therein, and a refrigerating mechanism disengageably associated with the cabinet and having a pair of spaced apart, upright evaporator units telescopically mounted in said cavities for refrigerating said storage chamber.

2. A refrigerator comprising a double walled, heat insulated cabinet formed to provide a food storage chamber and a chamber at the bottom thereof for accommodating refrigerating mechanism, one of the vertical walls of the cabinet being formed with an upright, elongated cavity, contiguous to the storage chamber, for receiving an evaporator unit therein, said cavity being in open communication at its lower end with said bottom chamber, a unitary, self-contained refrigerating mechanism disengageably associated with said cabinet and comprising operating means, a compressor and condenser apparatus disposed in said bottom chamber, and an upright evaporator unit telescoped into said cavity, and means mounted on and carried by said evaporator unit for closing the bottom of said cavity.

3. In a refrigerator of the character indicated, a double walled, heat insulated cabinet formed to provide a food storage chamber and a mechanism chamber at the bottom thereof, said latter chamber being open at the bottom, one vertical wall of the cabinet being formed with an upright elongated cavity, contiguous to and substantially coextensive with the height of the storage chamber, the bottom of said cavity being in open communication with said mechanism chamber, a unitary, self-contained refrigerating mechanism telescoped into the bottom chamber of said cabinet and detachably connected thereto, and comprising an upright elongated evaporator unit telescoped into said cavity, and detachably connected thereto, and means for closing the bottom of said cavity.

4. In a refrigerator of the character indicated, a double walled, heat insulated cabinet formed to provide a food storage chamber and a mechanism chamber at the bottom thereof, each of a pair of opposite side walls of the cabinet being formed with an upright elongated cavity, contiguous to and substantially coextensive with the height of the storage chamber, the bottom of each cavity being in open communication with said mechanism chamber, one wall of said mechanism chamber being formed with an opening for accommodating refrigerating mechanism, a unitary, self-contained refrigerating mechanism telescoped through said opening into said bottom chamber and detachably connected therein, said mechanism comprising a pair of fixed, spaced apart, upright evaporator units telescoped into said cavities and detachably connected therein, and means mounted on and carried by said evaporator units for closing the bottom of said cavities.

5. In a refrigerator of the character indicated,

a double walled, heat insulated cabinet formed to provide a food storage chamber and a mechanism chamber at the bottom thereof, said latter chamber having an opening in the rear wall thereof, each of a pair of opposite side walls of the cabinet being formed with an upright cavity, contiguous to and substantially coextensive with the height of the storage chamber, the rear wall of said cavities being open to permit telescopic entry of evaporator units, a unitary, self-contained refrigerating mechanism telescoped into said cabinet through said openings in the rear wall thereof and detachably connected therein, said mechanism including a mounting base, compressor and condenser apparatus operating and control means therefor, disposed in said bottom chamber, and a pair of spaced apart evaporator units telescoped into said cavities, and panel means detachably connected to the rear wall of the cabinet for closing said openings.

6. A refrigerator comprising a double walled, heat insulated cabinet formed to provide a food storage chamber and a chamber at the bottom thereof for accommodating refrigerating mechanism, said storage chamber being open at its lower end into said bottom chamber, all of the vertical walls of the cabinet being of insulation material, one of the vertical walls having an upright elongated cavity in its inner surface, said cavity having its inner side open to said storage chamber, and said one wall providing insulation material outwardly of said cavity, and refrigerating mechanism comprising a compressor, a condenser, operating and control means therefor mounted in said bottom chamber, and an upright elongated evaporator unit extending through the open lower end of said storage chamber into said cavity and being mounted in said cavity, said evaporator unit comprising a relatively flat sheet metal housing and a flat sinuous tubular coil enclosed within said housing, said housing being positioned to constitute a closure for the open inner side of said cavity.

7. A refrigerator comprising a double walled, heat insulated cabinet formed to provide a food storage chamber and a chamber at the bottom thereof for accommodating refrigerating mechanism, a door affording access to the interior of the storage chamber, partition means within said storage chamber to divide the latter into a plurality of separate compartments, a separate auxiliary door for each compartment, one of the vertical walls of the cabinet being formed with an upright, elongated cavity, contiguous to the storage chamber, for receiving an evaporator unit therein, said cavity being in open communication at its lower end with said bottom chamber, a unitary, self-contained refrigerating mechanism disengageably associated with said cabinet and comprising operating means, a compressor and condenser apparatus disposed in said bottom chamber, and an upright evaporator unit telescoped into said cavity, and means for closing the bottom of said cavity.

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